

A 72-year-old man is evaluated on day 2 after a coronary artery bypass graft surgery for severe coronary artery disease. He has no new symptoms except for mild sternal wound discomfort exacerbated by deep breathing. The patient's surgery was uncomplicated; he was extubated on postoperative day 1. Medical history is significant for type 2 diabetes mellitus and hyperlipidemia. He is afebrile. Blood pressure is 122/75 mm Hg, pulse is 75/min and regular, and respirations are 16/min. Oxygen saturation is 98% on room air. The sternal wound appears to be healing normally. Breath sounds are decreased at the left base. There is no abdominal distension or peripheral edema. Chest x-ray reveals a small, left-sided pleural effusion. Leukocyte count is 9,200/mm³ and serum creatinine is 1.1 mg/dL. Which of the following is the best next step in management of this patient?

- ☐ A. Chest tube placement
- ☐ B. Clinical observation
- ☐ C. Diagnostic thoracentesis
- ☐ D. Intravenous furosemide
- ☐ E. Oral antibiotics

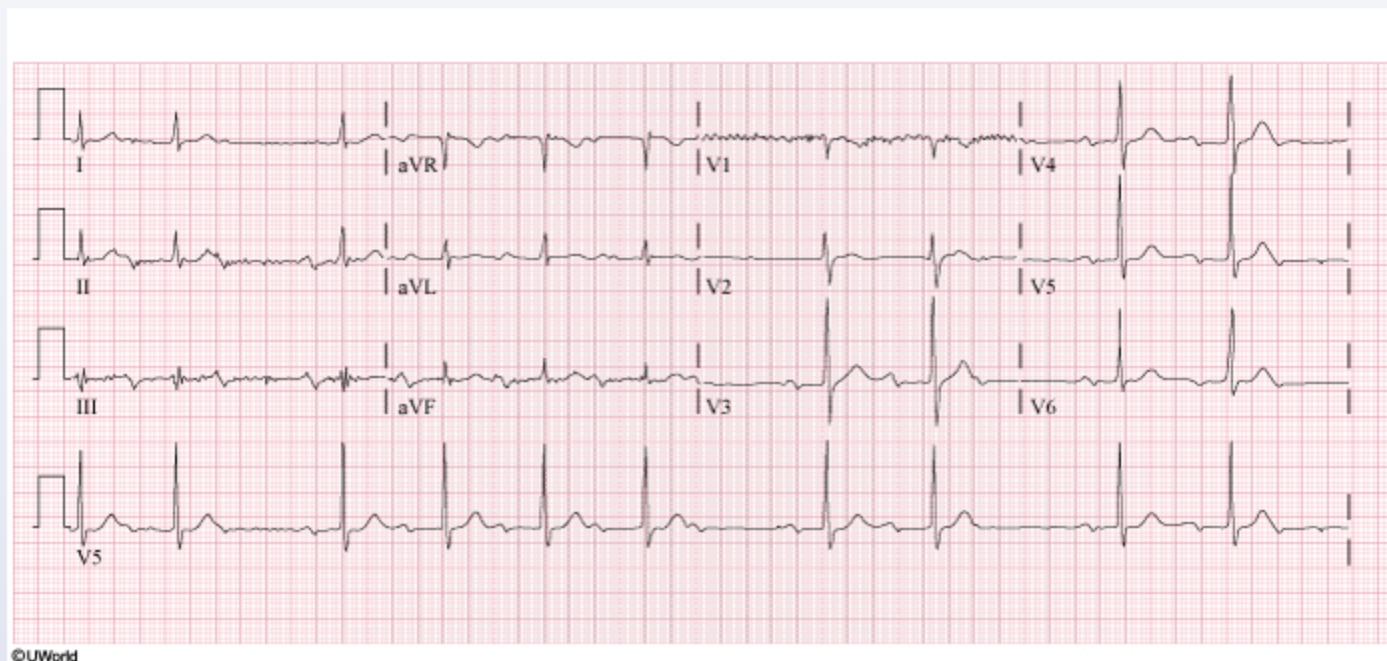
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A 1-month-old boy is brought to the clinic due to poor feeding. When nursing, he becomes diaphoretic, and for the past week he has fed for only 5 minutes at a time before falling asleep. The patient was born full term via spontaneous vaginal delivery. Today, his weight is 30 g (1 oz) below birth weight. Temperature is 37 C (98.6 F). Blood pressure is normal. Examination shows a thin infant who is sleeping but easily arousable. Cardiac examination reveals tachycardia and a I/V holosystolic murmur over the left lower sternal border with a diastolic rumble over the cardiac apex. The S2 is prominent. The patient is tachypneic, but the lung fields are clear to auscultation. There is no clubbing, cyanosis, or peripheral edema. Which of the following is the most likely cause of this patient's symptoms?

- ☐ A. Atrial septal defect
- ☐ B. Coarctation of the aorta
- ☐ C. Mitral stenosis
- ☐ D. Tetralogy of Fallot
- ☐ E. Transposition of the great vessels
- ☐ F. Ventricular septal defect

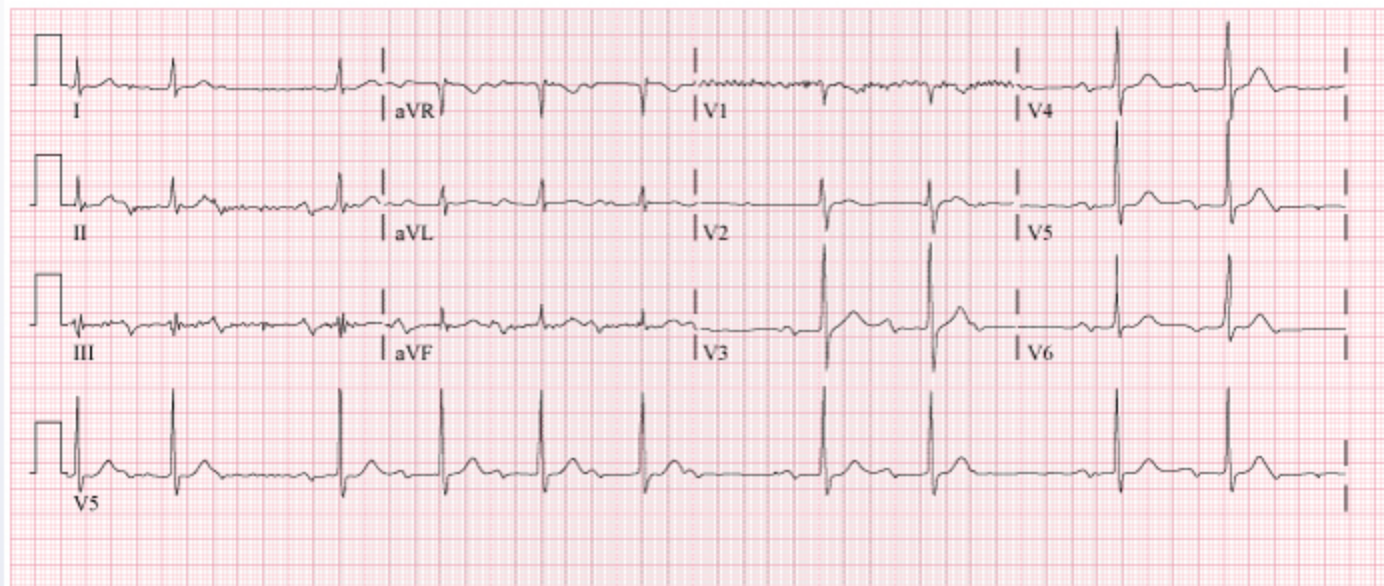
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A 56-year-old woman comes to the physician with 3 weeks of intermittent dizziness. She has no chest pain, dyspnea, or diaphoresis. Her medical problems include hypertension and type 2 diabetes mellitus. The patient says that her diabetes is well controlled. Her blood pressure is 155/90 mm Hg. Cardiopulmonary examination shows irregular heart rhythm. Electrocardiogram is shown below. (Click on image to enlarge)



Which of the following is the most likely diagnosis?

- ☐ A. Atrial fibrillation
- ☐ B. Complete heart block
- ☐ C. First-degree heart block
- ☐ D. Mobitz type I heart block



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Which of the following is the most likely diagnosis?

- ☐ A. Atrial fibrillation
- ☐ B. Complete heart block
- ☐ C. First-degree heart block
- ☐ D. Mobitz type I heart block
- ☐ E. Mobitz type II heart block

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A 24-year-old woman comes to the office due to pressure-like, substernal chest pain that occurs when she exercises. The patient began noticing the pain approximately 6 months ago when she started to exercise to lose weight. Prior to that, her lifestyle was largely sedentary. She has no associated nausea, vomiting, diaphoresis, dyspnea, palpitations, or syncope. The patient has no significant past medical history but was told as a child that she has a "murmur." She has no significant family history of heart disease. Blood pressure is 130/70 mm Hg on the right and 105/55 mm Hg on the left, and pulse is 72/min and regular. BMI is 29 kg/m². A palpable thrill is present in the suprasternal notch. There is a loud midsystolic murmur best heard at the first right intercostal space. The lungs are clear to auscultation. What is the most likely cause of this patient's chest pain?

- ☐ A. Anomalous origin of the right coronary artery
- ☐ B. Atherosclerotic narrowing of the coronaries
- ☐ C. Increased myocardial oxygen demand
- ☐ D. Stretching of the papillary muscles
- ☐ E. Systolic anterior motion of the mitral valve

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A 2-year-old boy is brought to the emergency department due to fever and respiratory distress. A week ago the patient had rhinorrhea and nasal congestion that spontaneously resolved. For the past 3 days he has had persistent fever and has become increasingly tired. Today his breathing is labored. The patient has no chronic medical conditions and is up to date with recommended vaccinations. Temperature is 38.2 C (100.7 F). Scattered, mobile, subcentimeter lymph nodes are palpable in the anterior cervical chain bilaterally. Cardiac examination shows tachycardia, an S3 gallop, and a grade 3/6 holosystolic murmur loudest at the cardiac apex. Brachial and femoral pulses are 1+. Pulmonary examination reveals tachypnea, nasal flaring, and subcostal retractions. Scattered wheezes are present at the lung bases and persist despite bronchodilator treatment. The liver is palpated 4 cm (1.6 in) below the costal margin. Which of the following is the most likely diagnosis in this patient?

- ☐ A. Acute rheumatic fever
- ☐ B. Asthma exacerbation
- ☐ C. Community-acquired pneumonia
- ☐ D. Kawasaki disease
- ☐ E. Viral hepatitis
- ☐ F. Viral myocarditis

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A 68-year-old man is recovering in the intensive care unit after coronary artery bypass graft surgery. Two weeks ago, he was seen in the office for progressive exertional angina and shortness of breath. The patient underwent coronary angiography, which indicated severe extensive coronary artery disease. After discussion about the risks and benefits, he agreed to proceed with open heart surgery. The patient has a family history of coronary artery disease but no sudden cardiac death, heart failure, or bleeding. On postoperative day 1, the nurses report that the patient is confused and has had reduced urine output. Temperature is 35.6 C (96 F), blood pressure is 80/50 mm Hg, pulse is 118/min and regular, and respirations are 22/min. There is no drainage from his sternal wound, and there has been no drainage in the chest tube over the last 4 hours. The lung fields are clear. No heart murmurs are appreciated. The abdomen is soft. His extremities are cool. ECG shows sinus tachycardia and nonspecific T-wave changes. Pulmonary artery catheter readings are as follows: Right atrium 20 mm Hg (normal: 2-8 mm Hg), right ventricle 35/20 mm Hg (normal: 15-30 mm Hg / 2-8 mm Hg), and pulmonary capillary wedge pressure 20 mm Hg (normal: 6-12 mm Hg). Which of the following is the most appropriate next step in management of this patient?

- ☐ A. Blood cultures
- ☐ B. Coronary angiogram
- ☐ C. CT pulmonary angiogram
- ☐ D. CT scan of the head
- ☐ E. Dobutamine infusion
- ☐ F. Echocardiogram

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A 64-year-old man comes to the emergency department due to chest pain. The pain is sharp, localized to the anterior chest, and exacerbated by deep breathing. Six weeks ago, the patient underwent coronary artery bypass graft surgery due to stable triple-vessel coronary artery disease. The patient also has a history of type 2 diabetes mellitus and early-stage chronic kidney disease. Temperature is 38 C (100.4 F), blood pressure is 144/78 mm Hg, and pulse is 99/min and regular. The sternal wound appears unremarkable, and there is no crepitus on palpation. No heart murmurs are heard. Breath sounds are normal. ECG shows sinus tachycardia with nonspecific ST-segment changes. Laboratory results are as follows:

Leukocytes 11,200/mm³

Hemoglobin 10.8 g/dL

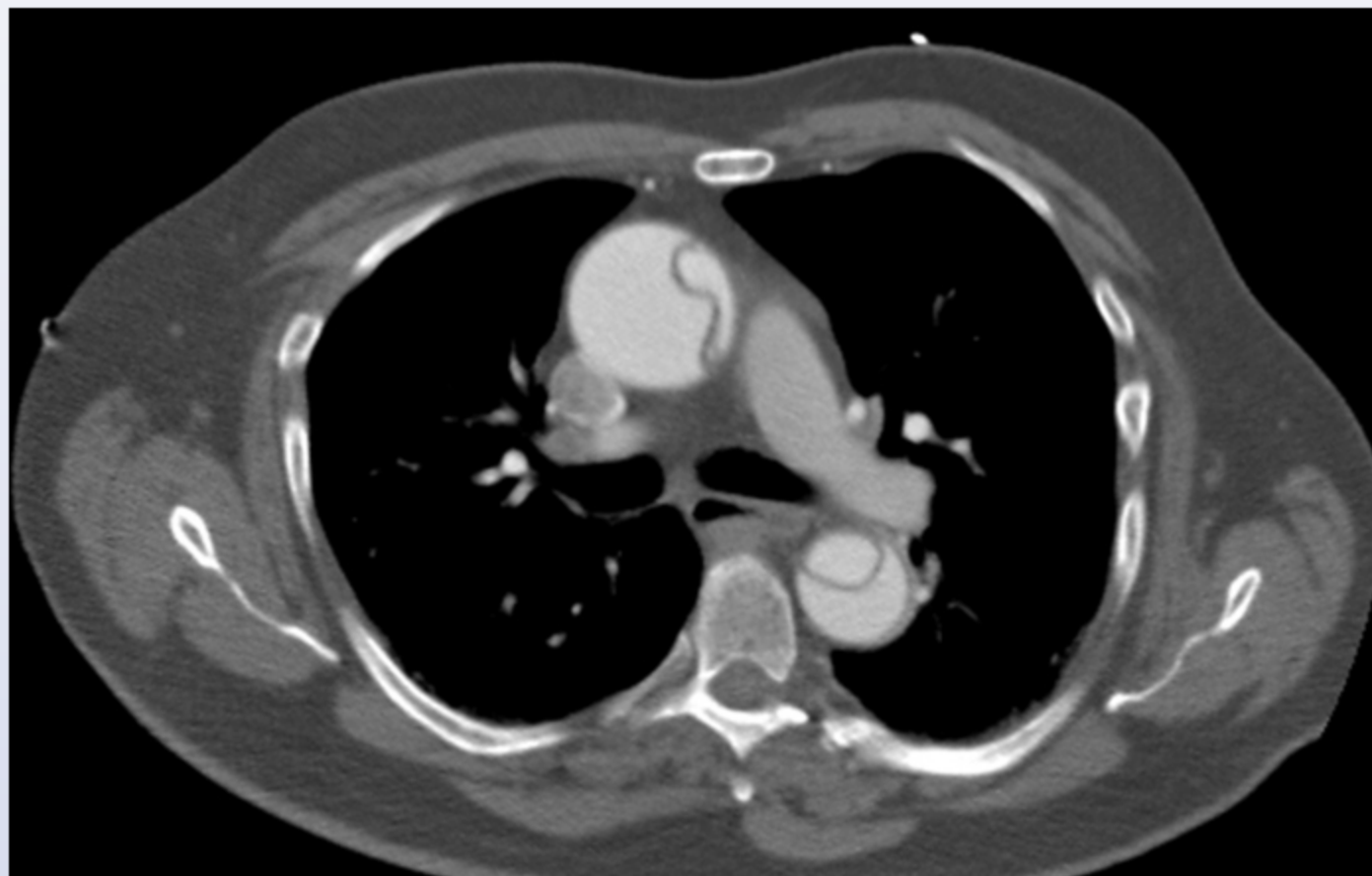
Platelets 380,000/mm³

Creatinine 1.5 mg/dL

Echocardiography shows normal biventricular function, no significant valvular disease, and a small pericardial effusion without evidence of cardiac compression. What is the most likely cause of this patient's current presentation?

- ☐ A. Bacterial mediastinitis
- ☐ B. Hemopericardium
- ☐ C. Immune-mediated inflammation
- ☐ D. Venous graft failure
- ☐ E. Viral infection

A 48-year-old man comes to the emergency department due to severe chest pain that started 2 hours ago. He has difficulty localizing the pain, saying that it "hurts all over my chest." He has had no shortness of breath, lightheadedness, syncope, or palpitations. The patient has no known medical conditions. He is a lifetime nonsmoker and does not use illicit drugs. His father died suddenly at age 52 from a presumed heart attack. Temperature is 36.7 C (98.1 F), blood pressure is 178/102 mm Hg, pulse is 105/min and regular, and respirations are 16/min. On physical examination, the lungs are clear to auscultation and heart sounds are normal. ECG reveals sinus tachycardia, voltage criteria for left ventricular hypertrophy, and T-wave inversion in leads V5 and V6. A CT image of the chest is shown below.





In addition to pain control, which of the following is the most appropriate, immediate pharmacotherapy for this patient?

- ☐ A. Furosemide
- ☐ B. Hydralazine
- ☐ C. Labetalol
- ☐ D. Nitroprusside
- ☐ E. Tissue plasminogen activator
- ☐ F. Unfractionated heparin

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A 56-year-old man comes to the office due to 3 months of dyspnea that was initially exertional but has progressively worsened to the point that the patient is now breathless even at rest. He has not had any chest pain, palpitations, syncope, or ankle swelling. The patient has no significant past medical history, and he takes no medications. He has been smoking a pack of cigarettes daily for the last 30 years and has been drinking alcohol heavily for the past 5 years. His mother died of breast cancer at age 57. The patient's temperature is 37.1 C (98.8 F), blood pressure is 113/76 mm Hg, and pulse is 86/min. A third heart sound is heard on cardiac auscultation; there are no murmurs. Chest auscultation indicates bibasilar crackles. His abdomen is soft and with no evidence of ascites. Laboratory results are as follows:

Complete blood count

Hematocrit	32%
Mean corpuscular volume	101 μm^3
Platelets	60,000/ mm^3
Leukocytes	6000/ mm^3

Liver function studies

Alkaline phosphatase	44 U/L
Aspartate aminotransferase	180 U/L
Alanine aminotransferase	66 U/L

Chest x-ray reveals cardiac silhouette enlargement and signs of pulmonary venous congestion. Echocardiography shows a dilated left ventricle with an estimated left ventricular ejection fraction of 25%. Coronary angiography reveals no evidence of obstructive coronary artery disease. Which of the following measures is most likely to reverse this patient's heart function?

Leukocytes

6000/mm³

Liver function studies

Alkaline phosphatase 44 U/L

Aspartate aminotransferase 180 U/L

Alanine aminotransferase 66 U/L

Chest x-ray reveals cardiac silhouette enlargement and signs of pulmonary venous congestion. Echocardiography shows a dilated left ventricle with an estimated left ventricular ejection fraction of 25%. Coronary angiography reveals no evidence of obstructive coronary artery disease. Which of the following measures is most likely to reverse this patient's heart function?

- ☐ A. Abstinence from alcohol
- ☐ B. Cessation of cigarette smoking
- ☐ C. Initiation of ACE inhibitor therapy
- ☐ D. Initiation of digoxin therapy
- ☐ E. Niacin supplementation
- ☐ F. Prednisolone therapy
- ☐ G. Reduction of salt intake

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A 22-year-old woman comes to the emergency department due to severe chest pain that she rates as 9/10. The pain started suddenly an hour ago and is constant. The patient also reports neck discomfort and right arm tingling. She has never experienced similar symptoms before. The patient has a history of short stature, scoliosis, and heart murmur. The patient does not use tobacco or illicit drugs. ECG shows sinus tachycardia without any significant ST segment changes. Urine pregnancy test is positive, and ultrasound shows a 12-week intrauterine pregnancy. Which of the following is the most likely cause of this patient's acute presentation?

- ☐ A. Aortic dissection
- ☐ B. Coronary thrombosis
- ☐ C. Flail mitral leaflet
- ☐ D. Pulmonary embolism
- ☐ E. Spontaneous pneumothorax

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A 68-year-old man comes for outpatient follow-up after recent coronary artery bypass grafting surgery. He describes anterior chest "clicking" and "shifting" when he bends or moves his upper extremities. The patient has no chest pain, dyspnea, fever, chills, or abdominal pain. He underwent uncomplicated surgery with internal thoracic artery harvesting 6 days ago for severe coronary artery disease. The patient is afebrile, and vital signs are within normal limits. Medical history includes diabetes mellitus, obesity, and chronic obstructive pulmonary disease. Examination reveals a midsternal wound that is clean with well-approximated sutures and minimal serous discharge at the lower edge but without erythema. On palpation the sternum appears to be rocking and clicking with patient coughing. Which of the following is the best management for this patient?

- ☐ A. Clinical observation only
- ☐ B. Compressive sternal dressing
- ☐ C. Negative pressure wound therapy
- ☐ D. Oral antibiotics
- ☐ E. Surgical exploration and sternal fixation

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A 56-year-old man comes to the office due to progressively worsening fatigue, difficulty concentrating, and increasing forgetfulness over the past several weeks. In addition, the patient has had vague abdominal pain and constipation and has gained 2.7 kg (6 lb) unintentionally over the last 3 months. Medical history is significant for hypertension, nonischemic cardiomyopathy with left ventricular systolic dysfunction, and atrial fibrillation. Blood pressure is 140/90 mm Hg and pulse is 75/min. Physical examination reveals regular heart sounds with normal S1 and S2. The lungs are clear to auscultation. There is no lower extremity edema, and the skin appears dry. Laboratory studies are as follows:

Sodium	136 mEq/L
Potassium	4.4 mEq/L
Chloride	98 mEq/L
Blood urea nitrogen	28 mg/dL
Creatinine	1.2 mg/dL
Glucose	100 mg/dL
Alkaline phosphatase	120 U/L
Aspartate aminotransferase	62 U/L
Alanine aminotransferase	74 U/L

Which of the following medications is most likely responsible for this patient's current symptoms?

- ☐ A. Amiodarone
- ☐ B. Digoxin

Potassium	4.4 mEq/L
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Glucose	100 mg/dL
Alkaline phosphatase	120 U/L
Aspartate aminotransferase	62 U/L
Alanine aminotransferase	74 U/L

Which of the following medications is most likely responsible for this patient's current symptoms?

- ☐ A. Amiodarone
- ☐ B. Digoxin
- ☐ C. Dofetilide
- ☐ D. Hydralazine
- ☐ E. Metoprolol
- ☐ F. Verapamil

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A 36-year-old woman comes to the emergency department due to chest pain that started suddenly while she was shopping at the mall. She also has shortness of breath, palpitations, and diaphoresis. The pain is retrosternal and radiates to the left arm. There are no aggravating or relieving factors. She appears to be in mild discomfort. On review of systems, the patient reports having had a runny nose, sore throat, and dry cough for the past 3 days. Her other medical problems include panic attacks treated with paroxetine and dysfunctional uterine bleeding treated with estrogen. Family history is significant for her father's sudden death at age 44 from a heart attack. The patient has a 15-pack-year smoking history. Her blood pressure is 144/90 mm Hg and pulse is 104/min and regular. Her body mass index is 29 kg/m². Which of the following is the most appropriate initial therapy for this patient?

- ☐ A. Acetaminophen
- ☐ B. Aspirin
- ☐ C. Heparin
- ☐ D. Ibuprofen
- ☐ E. Lorazepam
- ☐ F. Oxycodone

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A 34-year-old woman comes to the office for a follow-up blood pressure check. Over the last 12 months, the patient's blood pressure readings have ranged from 145/90 to 150/95 mm Hg. Her blood pressure was measured during a health fair 2 weeks ago and it was 145/90 mm Hg. The patient feels well, has no other medical conditions, and has never been pregnant. Medications include a combination oral contraceptive for the past 5 years and, occasionally, acetaminophen for relief of tension headaches. She does not use tobacco, alcohol, or illicit drugs. There is no family history of hypertension, stroke, deep venous thrombosis, or heart attack. Blood pressure is 150/90 mm Hg and pulse is 80/min. BMI is 22 kg/m². Physical examination and ECG are normal. Six months ago, the patient's total cholesterol level was 170 mg/dL. Complete blood count, urinalysis, and basic metabolic panel are unremarkable. Which of the following is the most appropriate next step in management of this patient's hypertension?

- ☐ A. Initiate a low-dose thiazide diuretic
- ☐ B. Perform a CT angiogram of the abdomen
- ☐ C. Prescribe an alternate form of contraception
- ☐ D. Reassure the patient; no intervention is required
- ☐ E. Recommend a diet and exercise regimen

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A 29-year-old man comes to clinic 2 weeks after an emergency department visit for epistaxis requiring anterior nasal packing. In the emergency department, his blood pressure was 170/110 mm Hg. He has occasional headaches and fatigue but no chest pain, palpitations, or syncope. His past medical history is unremarkable and he does not use tobacco, alcohol, or illicit drugs. The patient's current blood pressure is 180/112 mm Hg and pulse is 78/min and regular. Cardiac auscultation in the supine position reveals no murmurs or additional sounds. Abdominal examination shows no periumbilical bruits. ECG shows normal sinus rhythm, high-voltage QRS complexes, downsloping ST-segment depression, and T wave inversion in leads V5 and V6. Laboratory results are as follows:

Hemoglobin 14.2 g/dL

Platelets 230,000/mm³

Creatinine 1.0 mg/dL

Which of the following is the best next step in evaluation of this patient?

- ☐ A. Ambulatory blood pressure monitoring
- ☐ B. Bilateral arm and leg blood pressure measurements
- ☐ C. Cardiac auscultation in squatting and standing positions
- ☐ D. Carotid sinus massage
- ☐ E. Exercise stress testing

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A 67-year-old man comes to the office for a new patient evaluation after recently relocating to a retirement community. The patient has a history of hypertension treated with losartan. He is a former smoker with a 40-pack-year history and drinks alcohol occasionally. He is a retired school teacher. Blood pressure is 130/80 mm Hg and pulse is 80/min. Examination reveals a bruit in the right side of the neck, but the remainder of the examination is normal. Duplex ultrasonography of the neck arteries reveals a 60% stenosis at the right common carotid artery bifurcation. The left common carotid artery has a 40% lesion. Which of the following is the best next step in management of this patient's arterial abnormalities?

- ☐ A. Antiplatelet and statin therapy
- ☐ B. Bilateral carotid artery stenting
- ☐ C. Bilateral carotid endarterectomy
- ☐ D. Close monitoring with no intervention
- ☐ E. Right carotid artery stenting
- ☐ F. Right carotid endarterectomy

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A 42-year-old man is admitted to the hospital due to fever and shortness of breath. He has chronic hepatitis C, HIV, and alcohol-induced cardiomyopathy. Temperature is 38.6 C (101.5 F). Thrush is present in the oropharynx. Chest x-ray reveals right lower lobe consolidation. He is started on fluconazole and moxifloxacin. The patient's pneumonia and thrush improve over the next 2 days. However, he develops palpitations on the third day of hospitalization. His ECG strip is shown in the [exhibit](#). Which of the following is the most appropriate next step in the management of this patient?

- ☐ A. Adenosine
- ☐ B. Amiodarone
- ☐ C. Atropine
- ☐ D. Calcium gluconate
- ☐ E. Magnesium sulfate
- ☐ F. Sodium bicarbonate
- ☐ G. Sotalol

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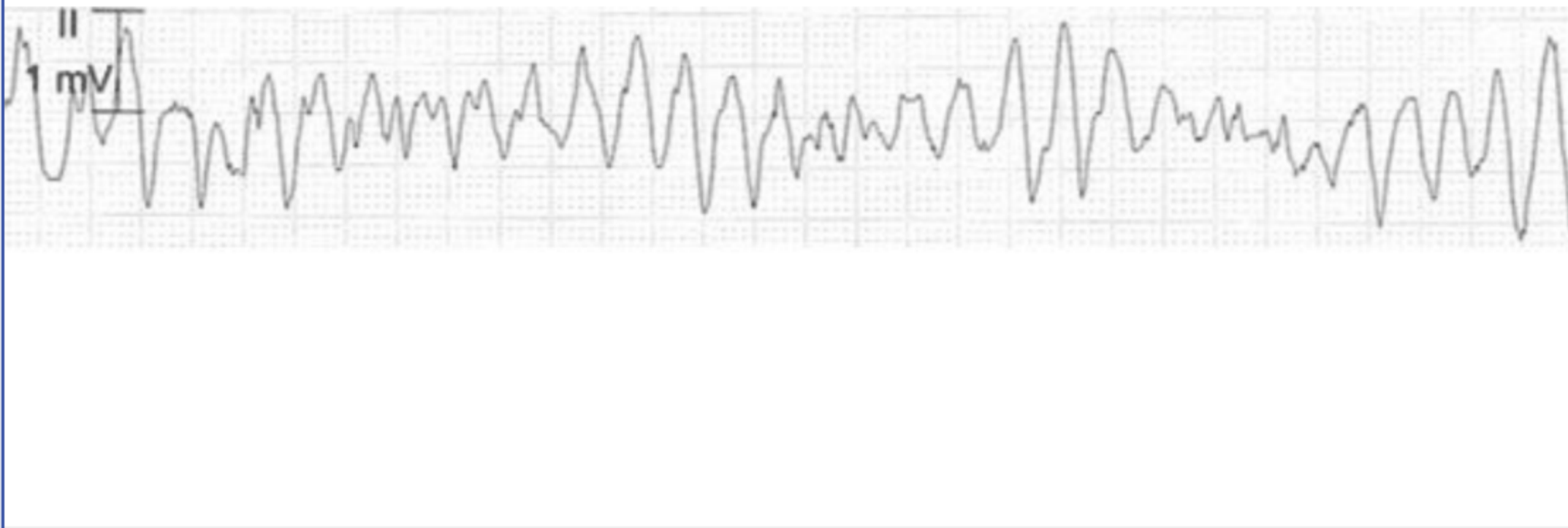
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A 62-year-old Caucasian female is being evaluated after she had an episode of syncope. She complains of having progressive exertional dyspnea over the last two months with an occasional dry cough. Cardiac auscultation findings over the apex are given below. Which of the following best explains the physical findings in this patient?

[Play Media](#)

- ☐ A. Ascending aortic aneurysm
- ☐ B. Constrictive pericarditis
- ☐ C. Mitral regurgitation
- ☐ D. Tricuspid valve stenosis

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A 65-year-old man comes to the physician for fatigue, poor appetite, and lower-leg swelling. Past medical history is significant for hypertension, type 2 diabetes mellitus, chronic cough, chest infections, and lower-extremity peripheral artery disease. The patient has a 40-pack-year smoking history. He does not use alcohol or illicit drugs. Physical examination shows a barrel-shaped chest, with bilateral scattered wheezing on auscultation. The patient's abdomen is distended, and the liver edge is palpated 4 cm below the right costal margin. There is 2+ pitting edema and dilated, tortuous superficial veins over both lower extremities. Manual pressure on the abdomen causes persistent distension of the jugular veins. His serum sodium level is 135 mEq/L, and creatinine is 1.2 mg/dL. An abnormality of which of the following is most likely the cause of this patient's edema?

- ☐ A. Portal venous resistance
- ☐ B. Pulmonary artery systolic pressure
- ☐ C. Pulmonary capillary wedge pressure
- ☐ D. Serum albumin level
- ☐ E. Urinary protein excretion

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A 58-year-old man is brought to the emergency department after an apparent suicide attempt. He was found lethargic by his wife, who also discovered a suicide note. The patient has a history of coronary artery disease and hypertension. His temperature is 37.7 C (100 F), blood pressure is 76/40 mm Hg, pulse is 40/min, and respirations are 12/min. Examination shows diffuse bilateral wheezing. Extremities are cold and clammy. ECG shows profound sinus bradycardia with first-degree atrioventricular block. The patient is given intravenous fluids and atropine; however, his bradycardia and hypotension do not improve. In addition to ensuring adequate oxygenation, which of the following is the most appropriate next step in management?

- ☐ A. Aminophylline
- ☐ B. Digoxin-specific antibody
- ☐ C. Dobutamine
- ☐ D. Glucagon
- ☐ E. Intravenous pacing

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A 69-year-old man is brought to the emergency department due to severe chest pain that started suddenly, approximately 3 hours ago. He describes the pain as sharp and the "worst pain in my life." He feels the pain anteriorly as well as in his neck and between the shoulder blades. The patient has not seen a doctor for the past 20 years and takes no medications. On physical examination he appears very uncomfortable. There is an early diastolic decrescendo murmur at the right upper sternal border. ECG shows sinus tachycardia with nonspecific ST-segment and T-wave changes. Chest x-ray reveals widening of the superior mediastinum. Which of the following is the most likely predisposing condition in this patient?

- ☐ A. Bicuspid aortic valve
- ☐ B. Deep venous thrombosis
- ☐ C. Fibrous atherosclerotic plaque
- ☐ D. Large vessel vasculitis
- ☐ E. Marfan syndrome
- ☐ F. Rheumatic valvulitis
- ☐ G. Systemic hypertension

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A 2-hour-old boy has developed worsening cyanosis over the past few minutes. The infant was delivered vaginally at term after an uncomplicated pregnancy. Birth weight was 4.1 kg (9 lb). Apgar scores were 7 and 8 at 1 and 5 minutes, respectively. Oxygen is administered by hood but does not relieve the cyanosis. Further examination shows tachypnea, subcostal retractions, a normal first heart sound, a single and loud second heart sound, and no murmur. Which of the following is the most likely cause of the infant's cyanosis?

- ☐ A. Atrial septal defect
- ☐ B. Coarctation of the aorta
- ☐ C. Dextrocardia
- ☐ D. Hypoplastic left heart syndrome
- ☐ E. Patent ductus arteriosus
- ☐ F. Tetralogy of Fallot
- ☐ G. Transposition of the great vessels
- ☐ H. Ventricular septal defect

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A 68-year-old man is brought to the emergency department after he passed out during an early morning jog. The patient felt lightheaded while jogging and sat down on the curb to prevent a fall. He was not confused after the episode and did not have bowel or bladder incontinence. A similar episode occurred 4 weeks ago; he felt lightheaded while climbing stairs but did not pass out. He has been having some exertional shortness of breath for the past few months but does not have any headache, blurry vision, or chest pain. The patient has hypertension controlled with hydrochlorothiazide but is healthy otherwise. He has a 20-pack-year smoking history and occasionally drinks a glass of wine. His blood pressure is 142/90 mm Hg, pulse is 80/min, and respirations are 16/min. Carotid pulse is delayed. S2 is diminished and an S4 is present. A grade 3/6 systolic ejection murmur is heard in the right second intercostal space. Neurological examination reveals no focal findings and there are no signs of head trauma. An electrocardiogram shows normal sinus rhythm with left ventricular hypertrophy. The first set of cardiac enzymes is negative. Which of the following is the most appropriate next step in management of this patient?

- ☐ A. 24-hour electrocardiographic monitoring
- ☐ B. CT scan of the head
- ☐ C. Echocardiogram
- ☐ D. Exercise stress test
- ☐ E. Tilt table testing

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A 32-year-old woman comes to the clinic due to progressively worsening dyspnea a month after returning from a vacation in Texas. The symptoms started with shortness of breath on exertion and have progressed to the point that she now wakes during the night with a choking sensation that improves only with sitting up. The patient has had a very active lifestyle for years, but currently she is markedly limited in her activities. She has no associated chest pain, skin rash, or joint pain. The patient has no significant medical history. Family history is significant for thyroid cancer in her aunt and lung cancer in her father. There is no family history of coronary artery disease, heart failure, or sudden cardiac death. She does not use illicit drugs. The patient currently lives in New York City. Temperature is 37.2 C (99 F), blood pressure is 110/70 mm Hg, pulse is 96/min, and respirations are 14/min. Bilateral pitting ankle edema is present. The liver is enlarged 2 cm below the right costal margin. Lung auscultation reveals decreased breath sounds at the bases bilaterally. Cardiac examination reveals the presence of a third heart sound. Chest x-ray reveals an enlarged cardiac silhouette and small bilateral pleural effusions. ECG shows nonspecific ST segment changes. Which of the following is the most likely cause of this patient's symptoms?

- ☐ A. Atherosclerosis
- ☐ B. Coccidioidomycosis
- ☐ C. Connective tissue disease
- ☐ D. Hypothyroidism
- ☐ E. Lyme disease
- ☐ F. Viral infection

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A 64-year-old man comes to the emergency department due to intermittent, burning midline chest pain over the last 2 hours. He has never had similar pain. The patient's medical history includes hypertension and hyperlipidemia. An immediate ECG shows sinus rhythm with ST-segment elevations in leads II, III, and aVF. Temperature is 37.8 C (99.7 F), blood pressure is 115/70 mm Hg, pulse is 65/min, and respirations are 15/min. He is given sublingual nitroglycerin, and the on-call cardiologist is notified. Three minutes later, the patient reports lightheadedness and extreme weakness. His repeat blood pressure is 75/50 mm Hg and pulse is 85/min. The patient is diaphoretic and his extremities are cold. Jugular venous pulse is 3 cm above the sternal angle in the semirecumbent position. The lungs are clear, and no murmurs are heard on auscultation. Which of the following is the best next step in management of this patient?

- ☐ A. CT angiography of the chest
- ☐ B. Immediate pericardiocentesis
- ☐ C. Intramuscular epinephrine
- ☐ D. Intravenous dopamine infusion
- ☐ E. Normal saline bolus
- ☐ F. Temporary cardiac pacing

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A 23-year-old man is brought to the emergency department after a motor vehicle collision. The patient was found unresponsive at the scene and intubated by the paramedics, who also administered 2 L of normal saline. He was the unrestrained driver. Upon arrival, blood pressure is 72/54 mm Hg, and pulse is 120/min. The patient responds to strong vocal and tactile stimuli by opening his eyes. Pupils are equal and reactive to light. Neck veins are distended. There are multiple bruises involving the anterior chest and upper abdomen. Chest x-ray reveals a small, left-sided pleural effusion and normal cardiac contours. Which of the following is the most likely diagnosis?

- ☐ A. Aortic rupture
- ☐ B. Bronchial rupture
- ☐ C. Cardiac tamponade
- ☐ D. Esophageal rupture
- ☐ E. Lung contusion

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A 53-year-old man is admitted to the hospital with a 4-week history of fatigue and decreased exercise tolerance. Climbing 2 flights of stairs causes significant dyspnea. He has had occasional palpitations for months but no chest pain. Past medical history is unremarkable, and a routine check-up 6 months ago was normal. He had 2 binge-drinking episodes last month but usually only drinks in moderation. The patient does not routinely take any medications. His blood pressure is 150/90 mm Hg and pulse is 130/min and irregular. Lungs are clear on auscultation. Electrocardiogram (ECG) does not show clear P waves. Echocardiography shows ejection fraction of 35%, moderate central mitral regurgitation, and left atrial and left ventricular dilatation with global hypokinesis. Which of the following interventions is most likely to restore left ventricular function in this patient?

- ☐ A. Coronary revascularization
- ☐ B. Decreasing afterload
- ☐ C. Inotropic medications
- ☐ D. Preload optimization
- ☐ E. Rate or rhythm control
- ☐ F. Valve surgery

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A 25-year-old woman, gravida 2 para 1, at 10 weeks gestation is brought to the emergency department by her boyfriend, who found her lying on the bed in a pool of blood. Her previous pregnancy was uncomplicated and resulted in a normal term vaginal delivery. She has no chronic medical problems. The patient takes a daily prenatal vitamin and does not smoke or drink alcohol. Temperature is 36.7 C (98 F), pulse is 120/min, and respirations are 20/min. Pelvic examinations shows blood clots throughout the vagina. The cervix is dilated, and there is a large amount of blood from the cervical os. On neurologic examination, she is somnolent but responsive to verbal stimuli and has 2+ deep tendon reflexes. Weak posterior tibial and dorsalis pedis pulses are palpable bilaterally. Which set of parameters is most likely to be seen in this patient?

	Cardiac output	Pulmonary capillary wedge pressure	Systemic vascular resistance	Blood pressure
☐ A.	↓	↑	↑	↓
☐ B.	↑	↓	↓	↓
☐ C.	↓	↓	↑	↓
☐ D.	↑	Normal	↑	↑
☐ E.	Normal	Normal	↑	Normal

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A 53-year-old man is brought to the emergency department after being involved in a motor vehicle collision as an unrestrained driver. The patient was found unresponsive at the scene and was intubated by the paramedics. On arrival, blood pressure is 74/50 mm Hg and pulse is 116/min. The patient is intubated and mechanically ventilated. The trachea is midline. There are multiple bruises over the anterior chest. Breath sounds are present and equal bilaterally, and heart sounds are normal. A central venous catheter is placed for fluid resuscitation. Initial central venous pressure (CVP) is 12 mm Hg (normal: 6-8). After rapid infusion of 2 L of normal saline, blood pressure is 78/52 mm Hg, pulse is 120/min, and CVP is 18 mm Hg. Which of the following is the most likely diagnosis?

- ☐ A. Anaphylaxis
- ☐ B. Blunt cardiac injury
- ☐ C. Hypovolemia
- ☐ D. Intracranial hemorrhage
- ☐ E. Spinal cord injury
- ☐ F. Tension pneumothorax

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A middle-aged man was recently diagnosed with hypertension. The prescribed antihypertensive medication enhances natriuresis, decreases serum angiotensin II concentration, and decreases aldosterone production. This medication most likely belongs to which of the following drug classes?

- ☐ A. Aldosterone receptor antagonist
- ☐ B. Alpha-adrenergic blocker
- ☐ C. Angiotensin II receptor blocker
- ☐ D. Direct renin inhibitor
- ☐ E. Loop diuretic

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A 55-year-old man comes to the physician with acute-onset muscle pain. His other medical problems include hypertension, hyperlipidemia, and a myocardial infarction 2 months ago. His medications include metoprolol, lisinopril, aspirin, and simvastatin. His blood pressure is 130/80 mm Hg and pulse is 60/min. Examination shows no muscle weakness. There is no hepatosplenomegaly. No skin rash is present. Liver function tests show slightly increased aspartate aminotransferase and alanine aminotransferase. The serum creatine kinase level is elevated. The physician suspects a drug-induced reaction. Which of the following is the most likely mechanism of action for this drug?

- ☐ A. Immune-mediated reaction
- ☐ B. Cell surface receptor blockage
- ☐ C. Extracellular enzyme blockage
- ☐ D. Inhibition of intracellular synthesis pathway
- ☐ E. Damage of membrane-bound lipids

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A 68-year-old man comes to the emergency department due to palpitations accompanied by mild dizziness and sweating. The symptoms started abruptly 30 minutes ago. He has had no chest pain or shortness of breath. Medical history is significant for hypertension and a myocardial infarction 6 months ago. The patient is an ex-smoker with a 30-pack-year history. Blood pressure is 102/65 mm Hg and pulse is 160/min and regular. Oxygen saturation is 98% on 2 L nasal cannula oxygen. On physical examination, prominent, high-amplitude jugular venous pulsations are seen intermittently at irregular intervals. ECG reveals a regular, wide-complex tachycardia. Which of the following best explains the patient's physical findings?

- ☐ A. Aortic regurgitation
- ☐ B. Atrial fibrillation
- ☐ C. Atrioventricular dissociation
- ☐ D. Pericardial effusion
- ☐ E. Tricuspid regurgitation

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A 53-year-old man comes to the physician complaining of worsening weakness and exertional dyspnea over the past 2 days. He had an upper respiratory illness 3 weeks ago but the symptoms never resolved completely. He has no chest pain or palpitations. His father died of a myocardial infarction at age 55. His blood pressure is 87/60 mm Hg and pulse is 109/min. Oxygen saturation is 95% on room air. His body mass index is 23 kg/m². Internal jugular venous pulsation is 11 cm H₂O. Lungs are clear to auscultation. Heart sounds are muffled. Which of the following is the most likely cause of this patient's complaints?

- ☐ A. Decreased cardiac contractility
- ☐ B. Decreased left ventricular preload
- ☐ C. Increased right ventricular compliance
- ☐ D. Left ventricular outflow obstruction
- ☐ E. Pulmonary hypertension

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A 65-year-old female is admitted to the hospital with increasing shortness of breath, weight gain and lower extremity edema. She has a history of hypertension, nonischemic cardiomyopathy with an ejection fraction of 30%, and hyperlipidemia. Her home medications include oral aspirin, digoxin, furosemide, metoprolol, lisinopril and atorvastatin. She is started on intravenous furosemide. On day three of hospitalization telemetry reveals six beats of wide complex ventricular tachycardia. Physical examination now shows decreased leg edema and clear lungs. Which of the following is the most appropriate next step in the management of this patient's tachycardia?

- ☐ A. Add spironolactone
- ☐ B. Add metolazone
- ☐ C. Measure serum electrolytes
- ☐ D. Discontinue atorvastatin
- ☐ E. Discontinue metoprolol

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A 2-year-old boy is brought to the emergency department by his parents for persistent, high fever over the last 6 days. The patient has been receiving ibuprofen and acetaminophen daily but has had minimal improvement. Two days ago, a rash developed along his trunk that has now spread to his arms and legs. Today, the patient has become increasingly irritable. He has no chronic medical conditions and has not received any vaccinations. Temperature is 39.4 C (103 F), blood pressure is 110/60 mm Hg, pulse is 120/min, and respirations are 24/min. Examination shows injected conjunctiva bilaterally with no discharge. The patient has fissured lips and an erythematous oropharynx. An erythematous, blanching rash covers the abdomen, arms, and legs. The hands are edematous, and the skin adjacent to the fingernails is peeling. There are 3 tender, 2-cm, left-sided cervical lymph nodes. The patient's laboratory studies reveal:

Complete blood count

Hematocrit	46%
Leukocytes	12,000/mm ³
Platelets	500,000/mm ³

Urinalysis

Protein	negative
White blood cells	7/hpf
Red blood cells	0/hpf
Casts	none

Erythrocyte sedimentation rate 58 mm/h

Which of the following is the most likely diagnosis in this patient?

Platelets

500,000/mm³

Urinalysis

Protein

negative

White blood cells

7/hpf

Red blood cells

0/hpf

Casts

none

Erythrocyte sedimentation rate 58 mm/h

Which of the following is the most likely diagnosis in this patient?

- ☐ A. Acute lymphoblastic leukemia
- ☐ B. Adenovirus infection
- ☐ C. Exanthematous drug eruption
- ☐ D. Kawasaki disease
- ☐ E. Measles infection
- ☐ F. Rubella infection
- ☐ G. Scarlet fever

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A 64-year-old man is admitted to the hospital with palpitations and lightheadedness for the past several days. He has experienced palpitations previously, but recently they have seemed sustained and "uncomfortable." The patient has had no chest pain or shortness of breath. He has a history of coronary artery disease and prior percutaneous coronary interventions. He is treated with metoprolol, lisinopril, aspirin, clopidogrel, and rosuvastatin. Echocardiogram shows mild left ventricular dilation, a left ventricular ejection fraction of 30%, and no major valvular abnormality. Serum potassium is 4.2 mEq/L and magnesium is 1.9 mg/dL. On day 2 of hospitalization, the patient develops sudden-onset palpitations that feel like "fluttering in my chest." Blood pressure is 122/60 mm Hg. He is alert and does not appear to be in distress. Examination shows clear lungs bilaterally. His ECG strip is shown below.



Which of the following is the best next step in management of this patient?

- ☐ A. Amiodarone
- ☐ B. Carotid sinus massage
- ☐ C. Digoxin
- ☐ D. Electrical cardioversion
- ☐ E. Esmolol

A 68-year-old woman comes to the emergency department due to sudden onset of chest pain associated with 2 episodes of vomiting. Past medical history includes hypertension for which she takes hydrochlorothiazide. Blood pressure is 80/50 mm Hg, pulse is 60/min, and respirations are 14/min. Examination shows diaphoresis, elevated jugular venous pressure, and a positive Kussmaul's sign. Her lungs are clear to auscultation. ECG shows 2-mm ST-segment elevation in leads II, III and aVF and 1-mm ST-segment depression in leads I and aVL. Which of the following is the most likely cause of this patient's hypotension?

- ☐ A. Interventricular septum rupture
- ☐ B. Intravascular volume depletion
- ☐ C. Pulmonary embolism
- ☐ D. Right ventricular infarction
- ☐ E. Variant angina

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A 34-year-old man comes to the emergency department due to chest pain that started an hour ago. The pain feels like a "substernal pressure," and the patient rates it as severe. He also feels as though his heart "is racing" but has had no shortness of breath, cough, or fever. The patient's medical history is significant for an appendectomy a year ago. He was seen in the emergency department 4 weeks ago for anxiety and palpitations and 6 weeks ago for chest pain that resolved spontaneously. His father died at age 64 due to "some heart problem," and his mother died of ovarian cancer. On physical examination, the patient appears agitated and is sweating profusely. His blood pressure is 160/110 mm Hg, pulse is 110/min, and respirations are 16/min. His pupils are dilated and reactive to light. No heart murmurs are heard. The abdomen is soft and nontender. ECG shows sinus tachycardia with ST elevations in leads V1-V4. What is the most likely explanation for this patient's symptoms?

- ☐ A. Acute pericarditis
- ☐ B. Aortic dissection
- ☐ C. Coronary atherosclerosis
- ☐ D. Pulmonary infarction
- ☐ E. Stress-induced cardiomyopathy
- ☐ F. Substance abuse

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An imaging study detects an incidental 3.5-cm infrarenal abdominal aortic aneurysm in a 70-year-old man. He has no associated symptoms. Medical history is significant for hypertension, type 2 diabetes, and hypercholesterolemia. The patient is maintained on anticoagulation due to paroxysmal atrial fibrillation. He has smoked 1-2 packs of cigarettes a day for the past 40 years, and he drinks 1 or 2 glasses of wine daily. The patient is physically active, bikes regularly, and enjoys hiking. On physical examination, blood pressure is 150/78 mm Hg and pulse is 80/min. Heart sounds are normal, and the lungs are clear. Laboratory results are as follows:

Serum creatinine 1.7 mg/dL

Low-density lipoprotein (LDL) 150 mg/dL

Hemoglobin A1c 7.8%

Which of the following is most strongly associated with aneurysm progression in this patient?

- ☐ A. Active smoking
- ☐ B. Anticoagulation
- ☐ C. Exercise activities
- ☐ D. LDL >130 mg/dL
- ☐ E. Systolic hypertension
- ☐ F. Uncontrolled diabetes mellitus

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A 19-year-old woman comes to the emergency department due to a 4–5-day history of chest discomfort that radiates to the nuchal fold and shoulders bilaterally. The patient took over-the-counter ibuprofen and had some pain relief. She reports associated fatigue and bilateral knee pain yesterday, which has since resolved. The patient has a history of systemic lupus erythematosus, for which she takes hydroxychloroquine. She does not smoke or take illicit drugs. The patient has no family history of cardiovascular diseases. Temperature is 38.3 C (100.9 F), and blood pressure is 110/70 mm Hg in the upper extremities bilaterally. Examination shows an erythematous rash over the cheeks and the nasal bridge. Pain is not reproducible with chest palpation. A superficial scratchy sound is heard between S1 and S2. Breath sounds are normal. ECG reveals sinus tachycardia at 103/min and diffuse T wave inversion. Laboratory results are as follows:

Hemoglobin 10.2 g/dL

Platelets 90,000/mm³

Creatinine 1.3 mg/dL

Serum troponin drawn on presentation is <0.01 ng/dL. Which of the following is the most likely explanation for this patient's symptoms?

- ☐ A. Acute pericarditis
- ☐ B. Cervical arthritis
- ☐ C. Costochondritis
- ☐ D. Myocardial ischemia
- ☐ E. Pulmonary embolism
- ☐ F. Verrucous endocarditis